

**NETHERLANDS
: EAST-INDIAN :
SAN-FRANCISCO-
COMMITTEE .**

**DEPARTMENT OF AGRICULTURE
INDUSTRY & COMMERCE**

■ ■ ■ No. XIII ■ ■ ■

**FOREST SERVICE
IN NETHERLANDS EAST-INDIA.**



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1914

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Teak-plantation, aged 6 months, with crop of *Leucaena glauca* for covering the soil.

FOREST SERVICE IN NETHERLANDS EAST-INDIA.

The islands of the East Indian Archipelago, when regarded from the point of view of development and civilisation, are invariably divided into two great groups, comprising on the one hand the islands of *Java and Madoera*, and on the other hand all the remaining islands of the Archipelago under the term *Outer Territories*. This division also applies to the Forestry of the Archipelago.

Java and Madoera are far in advance of the Outer Territories in general development, and equally so as regards forestry developments. This part of the subject will therefore be dealt with first.

The forests in Java and Madoera are chiefly composed of countless intermixed evergreen tree varieties. They consist, however, partly (principally in the low-lying areas) of forests mainly comprising only one kind of tree, viz: *Tectona grandis* (teak). This manner of occurrence, coupled with the superior qualities of the wood, was the reason that attention was originally directed solely to these teak forests. Even now they still yield by far the greater part of the revenue derived from forests.

The other forests are indicated by the collective term „Wild Timber Forests.”

In this connection the teak forests and „wild timber forests” will be discussed below quite separately, while further sections of this paper will deal with rubber growing and the Forestry Experimental Station. Then will follow a brief review of Forestry in the Outer Territories.

The Teak Forests.

The teak forests in Java occur principally in the lower and warmer areas in the central and eastern portions of the island. The places where teak is found are shown in black on the accompanying map.

Teak is found occasionally at elevations of more than 600 metres above sea-level, but the growth of such trees is unsatisfactory, as regards both their girth and height. In the lower areas, however, teak grows on all soils; even on the lime stone hills of Central Java, which are so poor in humus, and its development is perfectly satisfactory.

Growing in clusters, it forms extensive forests of a peculiar appearance, especially in the dry season, the so-called East Monsoon. Then the teak loses its leaves; here and there perhaps may hang a few withered specimen on the branches, but one sees little else than bare, grey-coloured trunks and boughs.

A few scattered evergreen trees, occasionally forming small clusters in the midst of the teak forest provide some little variety. The ground is covered with the large leaves, turned brown and crackling under foot, most of which after a little while catch fire; any green shrubs that may remain are soon scorched up and everything acquires a deadened aspect.

As soon, however, as the new rains break, the budding of the new leaves begins. Then the trees with their gigantic stature, their wide-spread boughs, their large leaves and flower-tassels, present a really magnificent appearance.

In view of its modest requirements as regards the fertility of the soil, teak does not meet with the least competition from other trees in low-lying, hilly and flat areas with soil of a barren nature, and such land is in fact covered with forests composed almost entirely of teak.

Djati wood, better known under the name of teak, is a durable kind of timber, possessing excellent technical qualities. It is comparatively light, shrinks and warps very little, and as regards solidity surpasses all European timbers, it is of medium hardness, is easily sawn, and is easy to work, it is used for shipbuilding, for building houses and bridges, for furniture, railway carriages, sleepers etc.

Since this timber was found in Java in large connected series of woods, it was natural that attempts were made already in the time of the East India Company, in the 17th

century, to derive some financial benefit from these forests.

Originally the native chiefs were obliged to supply a stipulated quantity of teak. These chiefs charged the population living in the neighbourhood of the teak forests with the work of cutting and transporting the timber. These compulsory deliveries were known by the term „blandong service.”

In the absence of any supervision or any regulations with regard to planting up the felled areas, it was unavoidable, that this compulsory cutting, coupled with partial clearings resulted in an appreciable decrease in surface area, and to some extent in the destruction of the existing teak forests. Only the most inaccessible portions remained untouched.

It was not until the middle of the 19th century that the Government realised the necessity for more scientific management of the teak forests, and in 1849 two German forestry experts were sent out to Java, to be speedily followed by some Dutchmen.

This was the beginning of improved forest administration.

In some years the felling over an extended area by the Natives and Chinese was substituted by a system of cutting in accordance with which a definite allotted forest section was cut down each year. Subsequently teak-seeds were widely sown in endeavours to restore these felled areas to cultivation; these attempts, however, did not prove very successful.

The staff was gradually strengthened, and in 1880 it was found possible to proceed with a sub-division into thirteen forest sections — actually enormous areas comprising on the average 20,000 to 40,000 hectares,*) and sometimes even a considerably larger area.

It is obvious that with areas of this size it was impracticable to exercise anything more than general control. The forests were worked entirely through the medium of contractors.

In 1894 a separate section of the Forest service was created which was exclusively engaged in Forestry Organisation Work (Surveying and mapping the forests, and subsequently arranging schemes of work in accordance with the results of a proper scientific inquiry etc.)

*) 1 Hectare = 2.47 acres.

In 1897 a new series of forest regulations were introduced, which stipulated that gradually all teak forests should be arranged on a definite plan, and divided into areas of about 5,000 hectares, the so-called „forest-district” which were to be distinguished from the „forest sections.”

Two of these forest districts are under the supervision of one Forest-officer, assisted by a staff of Europeans and Natives.

At the end of 1913 the total area covered by teak forests in Java and Madoera comprised 686,000 hectares, of which about 20% was included in forest-districts.

In these very much smaller sub-divisions it is possible to maintain close supervision, and the forests are worked exclusively by the department itself, all being carefully surveyed and mapped; they are divided into plots by means of rides and roads. The work is conducted in accordance with a definite scheme, which is revised every ten years. The plan of work for each decade lays down which plots are to be cut and which are to be planted.

The forest sections are not split up by means of rides. The Forest-officer draws up an approximate scheme of work based on available provisional data.

The difference in the strictness of the control exercised in the forest-sections and in the forest-districts is strikingly demonstrated by the following figures:

In the *forest-sections* the average quantities of teak wood obtained from one Hectare in the year 1913 were:

0.33 cub. metres for use as timber,
and 1.69 running metres for use as firewood,
while in the case of the *forest-districts* the corresponding figures were:

0.61 cub. metres for use as timber,
and 1.80 running metres for use as firewood.

Cultivation.

As already mentioned above, attempts were made in former times to bring the felled areas again into cultivation by sowing teak seeds. This work was performed by forced, unpaid labour



Teak-plantation, aged 18 months.

with practically no supervision, so that these plantations — as can well be imagined — have proved successful only on the more favourable sites.

This system was abandoned in 1865 for better methods, which have since developed into the so-called „forest-agricultural method” — a combination of field crops with high-forest. — with which very good results have been obtained, and which is still the method adopted in most cases.

After an area has been felled, inquiries are made for natives, willing to bring the land into renewed cultivation. They must thoroughly clear the land, and plant teak seeds in the soil at intervals of 1×2 or 1×3 metres.

Between the rows they are allowed to grow agricultural plants (rice, tobacco, maize, etc.)

They are required to keep the ground round the teak seedlings, which commence to sprout as soon as the first rains of the west-monsoon fall, quite clean and loose. After six months in soil—that is at all fertile and penetrable—the seedlings will already have reached a height of 1 metre (see plate I); after two years it is in most cases no longer possible to retain interplanted agricultural crops, especially as for some years past use has been made of a shrub belonging to the family of *Leguminosae*, viz: *Leucaena glauca*, which must be sown between the rows of teak in order the more quickly to obtain a complete covering for the ground, to improve the condition of the soil, and to prevent the growths of harmful weeds, such as „alang-alang,” when the planters cease active cultivation. In addition to the entire crop of the agricultural plants, the planting contractors receive a certain amount of remuneration in cash. Plate II illustrates a plantation after 18 months' cultivation, interplanted with *Leucaena glauca*.

It need hardly be mentioned that not only the areas felled in process of exploitation are immediately brought into cultivation again, but open spaces are likewise planted up.

Once a given area is handed over by the contractors, as having been successfully planted up, all that is necessary for several years afterwards is to take precaution against fire and cattle grazing.

As soon as the tops of the trees begin to touch, which occurs in from 5 to 15 years' time, in accordance with the more or less favourable nature of the site, the first thinning of the plantation must take place, but it is important that this should not be too drastic, nor be taken in hand too early, in order to prevent any renewed growth of the dreaded „alang-alang". Plate III shows a 12-year old teak plantation.

The proceeds from thinning, which in the case of a young plantation, are not sufficient to cover the expense, increase with the age of the plantation; this is the reason that thinning very soon yields a profit.

The total extent of the newly planted areas amounted in 1900 to 4412 hectares, in 1908 to 7325 hectares, and in 1913 to 7778 hectares.

Exploitation.

In the natural forests, trees of all ages are found intermingled. It may be taken that the artificially planted teak forests, which comprise, of course, trees of practically the same age, are ripe for felling when they are from 80 to 100 years old. Plate IV is an illustration of an old teak forest.

In former times the felled tree used to be cut up exclusively by means of axes. It is astonishing how accurately and neatly the Javanese wood-hewers in the Rembang teak-sections can convert the trunks into beams with this primitive implement. As, however, this method involves the loss of too high a percentage of wood, various attempts have been made during recent years to replace the axe by the saw.

When a section is destined for felling, the trees are devitalised two years previously by girdling them, i. e. by cutting the bark on the lower part of each trunk right through to the cambium in order to prevent any further flow of sap. During these two years, the trunks dry sufficiently to obviate the timber splitting after being felled.

The exploitation of the timber in the forest sections is conducted exclusively by the Forest service itself, the methods



Teak-plantation, aged 12 years.

adopted, being as follows: The felled trunks are brought into a transportable condition in the forest and then hauled away.

This haulage is usually done by teams of oxen — donkeys are used at only a few places — who haul the timber by means of steel ropes out of the forest to a collecting centre. Plates V and VI give a clear idea of the procedure.

For further conveyance from the collecting centres, use is chiefly made of trucks, running on a railway track. The timber is loaded on the trucks which are then conveyed by coolies, or with the help of a locomotive (plate VII) to the timber yards, which are usually situated at the side of a railway—or tramway-line, where it is sorted out and stacked up in separate lots. Here it is subsequently sold in a given date to the highest bidder.

The railway tracks over the rough forest land, which is intersected by numerous rivers and streams, are constructed in the forest-sections and forest-districts — so far as the exploitation of the latter is not let out to private contractors — entirely by the staff of the Forest-service. Plate VIII gives some idea of the difficulties which often have to be contended with in the construction of these railways.

During the last few years trials have been begun with the use of monorail tracks (Plate IX) on land, where transport by means of the ordinary light railway would be too costly, e.g. on small scattered forest sections yielding comparatively small quantities of timber, where, owing to the lack of roads, cart transport is impossible; these trials have amply demonstrated the great utility of this means of transport. Not only is the cost of construction per K.M. appreciably lower, but the actual cost of transport per cub. metre and per running metre is also less, so that the monorail has rendered possible the complete exploitation of several forests which otherwise could not have been profitably worked.

The exploitation of the timber in the forest-sections is for the most part in the hands of private contractors, who lease the timber rights by payment of an agreed sum; this method of working, however, is to be gradually replaced by felling

by the staff of the Forest service, since private exploitation is not adapted to modern „intensive” methods.

Excluding the yield obtained from thinning, the total production of timber amounted to:—

	124,000	cubic metres	in the year	1900,
	242,000	„ „ „ „ „	1908,	
and	269,000	„ „ „ „ „	1913.	

The amount of timber felled for fire wood has also greatly increased since 1900.

The wild timber forests in Java.

So great is the economic value of teak for Java, that all other kinds of wood are comprised under one general name — „wild timber”. All wood, apart from teak, was of such minor importance that it has been given a collective term, plainly indicating its inferior rank.

Slowly and in proportion as the demand for timber in Java has increased, the value of wild timber has been recognised to a correspondingly great extent; still the fact remains that teak is *the* wood, and that wild timber plays a comparatively insignificant role.

The number of various kinds of timber in Java is at a low estimate computed to amount to fully 2000. Of this large number of varieties, however, the great majority are of such poor quality that they can only be used for firewood. The growth of trees in the tropics is certainly very rapid, but what one gains on that account in the *quantity* of timber grown, is usually lost in the *quality* of the wood.

The composition of the wild timber forests in Java varies very greatly in accordance with the more or less dry regions in which they occur, and with the elevation at which they grow on the mountains. A general characteristic, however, is that they are all composed of a very large number of varieties, and that they possess a very dense undergrowth of all kinds of shrubs, rattans and weeds.

When walking along the footpath in these forests one sees nothing but all kinds of shrubbery right and left, and it is quite impossible for the eye to penetrate the forest walls.



Teakforest.

From some distance away as a rule, no flat roof of tree tops can be seen but high above the ordinary level of the tree summits a number of crowns of forest giants rise like huge molehills. The height of the tree is usually very great, heights of 40 metres*) being by no means exceptional.

The chief importance of the wild timber forests (so far as Java is concerned) lies, at least for the present, not so much in the value of the wood as in the hydrological and climatological influence of the hill forests. Java is a long island covered throughout its length with a chain of volcanoes, the summits of which reach a height of about 3,000 Meters above sea-level. Like huge bullets they tower up from the plains; in some places plateaux have been formed between them. From these mountains flow down numerous rivers, whose waters are used for irrigating the fields, the so-called „sawahs” (rice fields). As is well-known, Java is a rice country, par excellence. The rice is grown by preference on fields that can be kept under water until the plants begin to ripen. These fields are accordingly split up into a series of terraces surrounded by small dikes. The water is drawn off from the rivers by means of numerous canals leading to the ricefields. Some rivers even disappear before reaching the sea as a result of having been diverted into all kinds of canals which absorb the whole of their water.

Where a country is dependent to so great an extent on the water supply from its rivers, and where the occurrence of monsoons (i.e. the alternation of a rainy—with a dry season) results in a shortage of water during the dry season, it is obvious that the hydrological influence of the mountain forests is a factor of the greatest consequence for the whole island. By this is meant the effect such forests have in regulating the water supply, so that the water does not flow off too quickly during the wet season, and the river sources continue to yield water in the dry season. So marked is the importance of this hydrological influence, that the climatological effect of the mountain forests (in the direction of increasing the rainfall etc.) is by comparison relegated to the back-ground.

*) = about 44 yards.

As the clearings have begun to reach higher up the mountain-sides, the Government have come to recognise the necessity of putting a limit to these clearings by forming forest reserves on the mountains. *The most important duty then of the wild timber forest supervisers consists in locating, enclosing and guarding the forest reserves.*

The area of Java is 13 million hectares,*) of which 1 million hectares now consist of forest reserves. The sites of the forest reserves are specified by the Government acting on the advice of the forest-officers and local authorities. The boundaries of these reserves are marked out by the officials of the Forest service.

The climate of Java, and particularly the rainfall, varies considerably as one goes from West to East.

West Java has an abundant rainfall with no very pronounced dry season; East Java on the other hand has during the months June to October a very dry period.

This results in great difficulties in that part of the country, in the re-forestation of barren hill slopes, since the grass wildernesses which form on such land, so easily catch fire.

The native clearings (especially in East-Java) had reached too high when a commencement was made with the creation of forest reserves.

The re-forestation of these clearings forms an important duty of the Forest service in Java.

The creation of tropical wild timber forests by means of planting is a difficult problem, that still in many cases leads to disappointment. Besides planting, another method is also sometimes adopted — that of the so-called spontaneous re-forestation. The basic idea of this method is, that trees will grow spontaneously on the grass wildernesses as a result of seeds being brought from the neighbouring forests by birds and by the wind, provided the grass is protected against fire and cattle. Favourable results have been obtained at several places in this way.

In addition to the forest reserves, there are still some virgin wild timber forests in Java which will gradually be cleared

*) = about 32 million acres.



Hauling logs with the donkey-engine.

for agricultural purposes, but which mostly consist of inferior and blighted trees.

Among the wild timber forests, a distinctive class is formed by the „flood forests,” — i.e. forests growing along the flat muddy shores and consisting of mangroves (*Rhizophora*), which are inundated at high water but are dry again at ebb tide. The clearing of such land is impracticable. Along the coasts of Java these forests extend for considerable distances. Their wood is used for firewood and for the construction of native dwellings, and the bark in some cases is used for fixing the colours in the batik-dying process.

They form the green fringe along the low-lying coasts of the islands in the Archipelago, and present a peculiar appearance, owing to the trees standing on stilt-like roots, so that one sees a large part of the roots projecting above the ground.

The value of wild timber in Java has increased during recent years as a result of the continued rise in the price of teak. Besides importing from the other islands in the Archipelago, Java will eventually be compelled to provide a portion of its own timber requirements by utilising wild wood. The natives in the mountain districts especially have to fall back on the wild timber forests to supply their needs. For that reason many of these forests are reserved not merely on account of their hydrological influence, but also for timber supply purposes.

In view of the difficulties attached to transport in mountainous country, the trees are sawn into beams and planks in the forests on the spot. The adjoining illustration represents the exploitation of a mountain forest of this kind in active progress (Plate X). A log has been sawn off from a felled trunk, and has been rolled on to a scaffold so that one of the sawyers can take up his place underneath the log. In order to give him more room, a hole has been dug in the ground. Two sawyers then proceed to divide the log into beams, which are thereupon carried out of the forest. The total quantities of timber exploited in this way, however, are still relatively small.

The kinds of wood utilised in different places vary considerably owing to the great diversity in the composition of the

forests. For example in the eastern portion of the Preanger and Batavia Residencies (i.e. districts in West Java comprising hilly and mountainous country) the following local tree varieties are of importance as yielding timber of some value:

Rasamala, *Altingia excelsa* Noronhae, yielding timber for building houses and bridges.

Manglid, *Manglietia glauca* Bl., for building houses, bridges, for furniture and implements.

Saninten, *Castanea argentea* Bl., Kihioer, *Castanea javanica* Bl., Pasang batoe, *Quercus* sp., Kipoetri, *Podocarpus neriifolia* Don; Djamoedjoe, *Podocarpus cupressina* R. Br.; Poespa, *Schima Noronhae* Reinw.; Gadoh, *Bischofia javanica* Bl.; Laban, *Vitex pubescens* Vahl.; Boengoer, *Lagerstroemia flos reginae* Retz.; Kihiang, *Albizzia procera* Benth.; all providing timber for building houses etc. Soeren, *Cedrela febrifuga* Bl.; Hoeroe-Koneng, *Litsea mappacea* Boerl.; Djeungdjing laoet, *Albizzia moluccana* Mig.; Koe raj, *Trema orientalis* Bl.; Mara, *Macaranga rhizinoïdes* Muell. Arg.; Kihoedjan *Engelhardtia spicata* Bl.; all used for packing cases for the tea factories. The use of these kinds, however, is so local that the varieties named above are by no means used everywhere, even in the relatively small district referred to.

In East Java a special form of forest occurs — the bamboo forests, which are of some local importance for the supply of bamboo, which is sold in large quantities as building material, and especially as drying sticks in the tobacco sheds.

The timber trade.

In the last decades of the preceding century, the exploitation of the teak forests was exclusively in the hands of the above mentioned private contractors, who accordingly had the disposal of the whole production, and thus had the timber trade entirely in their own hands.

Since then, however, the work of exploitation has been undertaken to a steadily increasing extent by the Forest-service itself. In 1913 the quantity of timber felled by the Forest-service



Donkey-engine (for hauling the logs to the railroad).

was 144,000 cubic metres, while the quantity cut by contractors amounted to 118,000 cubic metres.

The timber cut by the Forest-service is conveyed as far as possible in but slightly hewn, rough and round shapes to the timber yards, where it is assorted into piles of logs of as far as possible equal dimensions, and sold by public auction.

It then rests with the timber trade to collect the raw product into such lots as are required by the various consumers. The complete extension of the system of cutting logs will tend in proportion as the number of forest-districts is increased, and as the roads and railway tracks, with the construction of which energetic progress has been made for several years past, facilitate the more complete opening up of the forest areas, to effect a still further considerable increase in the quantity of unhewn wood placed on the market. The timber must be worked into beams, planks etc. in the private saw-mills. In this way each trunk is made to yield the greatest possible quantity of serviceable timber, so that the total production of such timber is considerably greater than if the preparation of the beams were to take place in the forest.

The export of teak has increased in importance since 1903, when the quantity of timber exported amounted to 28,000 cubic metres. In 1912, the corresponding figure was 49,000 cubic metres, the distribution of which was as follows:

To Europe	78.3%
„ Africa	10.5%
„ Asia	8.8%
„ America	2.3%
„ Australia	0.1%

The greatest part of the teak placed on the market, however, is utilised in Java itself; it is in fact indispensable for many purposes in that island.

The net revenue of the Forest service amounted to:

376,800 dollars U.S. curr.	in 1900,
854,400	in 1908,
926,800	in 1913.

The Cultivation of Rubber.

When in 1900 attention was directed in various parts of the world to the cultivation of rubber-yielding plants, the Forest service in Java promptly took up the question of rubber growing, and large areas were planted up, principally with *Ficus elastica*.

In 1910 a number of independent privately-owned rubber estates were established. Owing to the fall in prices the production of rubber from the *Ficus* trees ceased to be profitable, and the great majority of these trees were therefore substituted by plantations of *Hevea*.

The Government production of rubber in 1913 amounted to 126,000 Kg., of which 75,000 Kg. were obtained from *Ficus*, 48,000 Kg. from *Hevea* and 3,000 Kg. from *Castilloa*.

Experimental Station.

An experimental station for forestry was established at Buitenzorg in 1913. Investigations were taken in hand in regard to tree measurement, thinning, statistics of yield, etc., while advice and control were given and exercised in connection with experiments and research work undertaken by various forest-officers. In view of the very short time this experimental station has been in existence no results can yet be announced.

Forestry in the Outer Territories.

As explained above in the preface, all the islands of the Archipelago apart from Java and Madoera, are comprised under the term „Outer Territories”.

These colonies, having a total area of about 180,000,000 hectares are to a considerable extent (estimated at approximately 50%) covered with wild timber forests, which, as in Java, consist of countless intermingled tree varieties.

Teak forests also occur, but at a very few places, among which may be mentioned the Island of Moena to the South East of Celebes. Their area, however, in proportion to that of the wild timber forests, is of little importance.



Monorail (railroad consisting of one rail only).

Accurate particulars regarding the extent, composition, etc. of these forests have only been collected in respect of some few places.

Until a short time ago, owing to the slight extent to which these territories were developed, there was no question of there being any proper forest administration. During the last few years, however, a change has been made in this respect, and every year an increasing number of forest-officers and other officials are stationed on the various islands.

The activities of this staff must be confined for the present to collecting general information, although it is intended as soon as a general system of administration has been instituted, to proceed at once with the exploration of certain places which are most suited to timber felling operations on a large scale.

At present the exploitation of timber still bears a chiefly local character, and consists of providing supplies for certain main centres where there is a large demand for timber; this applies particularly to a few districts which supply the saw mills of Singapore every year with about 200,000 cubic metres of timber.

Among the wood varieties which are particularly suitable for timber-purposes, the species belonging to the family of *Dipterocarpaceae* deserve especial mention. These varieties have already attracted the attention of private contractors; some large forest exploitation companies are now being formed, and will probably proceed before long to carry out the exploitation of this timber on a very large scale; it is intended to place this wood on the world's markets, where its splendid qualities should soon gain for it a high reputation.

The activities of the Forest service are directed towards effecting a speedy increase in the number of such exploitation undertakings; this field thus prevents a good opportunity for capitalists to open exploitation works on modern lines, such as already exist in the Philippines.

Besides timber the forest by-products, such as rattans, resin, rubber, bark and fruit, are of very great importance. These

are collected by the natives, and yield the Treasury only direct revenue in the shape of export duty.

This now amounts to about \$ 400,000 per annum, while the value of the produce is estimated at 8 to 10 million dollars.

Although forest administration in the „Outer Territories” is in its earliest stages of development, it may confidently be anticipated that it will speedily increase very considerably in importance.

Staff.

The following is a summary of the staff of the Forest service in the years 1900 and 1913:

	1900.	1913.
Inspector General of forests	1	1
District Foresters	3	6
Forest-officers (supervisors)	28	55
Student Forest-officers	10	14
Assistant Forest-officers 1st Class	1	5
„ „ „ 2nd Class	10	2
Chief Vranglers	0	19
European Vranglers	43	124
„ Assistant-Vranglers	23	43
Native Vranglers	0	7
Native Assistant-Vranglers	1	33
Chief Surveyors	1	2
European Surveyors	6	9
European Assistant Surveyors	2	0
Native Surveyors	20	25
Forest Police { Native Guards	135	343
Native Watchmen	225	544
Total	509	1232

A diagram is appended showing the revenue of the Forest service from the year 1900 onwards, from which it will be seen that the increase in the expenditure on the staff has been proportionately very much less than the rise in total expenditure.



Bridge in the teakforests.

Diagram representing revenue & expenditure
from 1900 to 1913 inclusive.



